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High-School Pupils of Today

By R. W. TYLER

THE investigation of this problem was stimulated by frequently hearing the assertion that the present graduates of the high schools are decidedly inferior in scholastic attainments to the graduates of five years ago. This complaint in various forms is voiced by parents, citizens, college teachers, and officials, and even by some high-school teachers. If this indictment of our high schools is true, it is worthy of careful consideration. Unfortunately, neither the plaintiffs nor the high schools seem to have adequate evidence at hand.

Are our present high-school graduates as well trained in languages, mathematics, sciences, history, and other subjects as were the graduates of previous years? This question can be answered only in the light of objective evidence: the attainments of pupils of the past can be compared with the attainments of the pupils of today. Such evidence is available only where objective achievement tests were given in the past and the records of the results preserved. It is not necessary that these be standard tests, but they must be so objectively scored that the results can be fairly compared with the scores made on the same tests by present pupils.

The most difficult part of this project has been the collection of records of objective achievement tests which had been administered to high-school pupils prior to 1925. Last year letters were sent to members of the Research Department of the Ohio Education Association, and to directors of research in Ohio city schools, describing the project and asking for information about any previous test records which would be useful in the study. By limiting the comparison to Ohio high schools, it was hoped that a rather thorough job of unearthing old test records might be done.

The first letters brought a few returns together with suggestions of other schools which were likely to have such records. Each of these leads was followed up as the drive for records continued. From Dr. A. R. Mead's files at Ohio Wesleyan University, several sets of useful records were obtained. The Public School Publishing Company also had a comprehensive record of the results of Pressey English tests given to Ohio high schools in 1924. This company supplied records for those high schools which were willing to have these confidential results made available to the investigator.

TABLE I

SAMPLE RECORDS RECEIVED FROM CO-OPERATING CITIES

	Date of Test	Number of Pupils	Median Score	Mean Score	Standard Deviation	Amount of Study Preceding
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Glenn Physics Test MC:						
Akron	Dec., 1922	173	12.3	.....	.....	One year
	May, 1930	262	16.3	.....	.....	One year
Moore Mathematics Test:						
Columbus—South High	Dec., 1924	160	.....	71.1	.....	One and one-half years
	May, 1930	138	.....	75.8	.....	One and one-half years
Pressey Tests in English Composition:						
Ashland						
Grammar	1924	116	.....	22.1	6.2	.....
	1930	91	.....	22.2	5.6	.....
Sentence Structure	1924	116	.....	18.8	3.9	.....
	1930	91	.....	18.4	3.4	.....
Capitalization	1924	116	.....	22.5	3.0	.....
	1930	91	.....	23.7	3.1	.....
Punctuation	1924	116	.....	18.4	5.3	.....
	1930	91	.....	20.1	5.0	.....

Whenever old test records were discovered, a letter was sent to the high school concerned requesting co-operation in administering the same tests to corresponding pupils of today. If the school had not planned to repeat the test, the investigator provided the test forms and scored the tests. An analysis of these test results will provide an answer to the question: Are our present high-school pupils as well trained scholastically as those of previous years?

To date, old test records in one or more subjects have been received from high schools in the following Ohio cities: Akron, Ashland, Bedford, Bowling Green, Chardon, Columbus, Co-

shocton, Defiance, East Liverpool, Galena, Gallipolis, Grandview Heights, Kent, Kilbourne, Madison Mills, Martins Ferry, Marysville, Nelsonville, North Baltimore, Pickerington, Piqua, Toledo, Wellston, Wickliffe, Williamsport, Wyoming, and Youngstown. The same tests were administered to corresponding pupils in many of these schools last spring. Others will be given during the autumn. A sample, only, of the comparisons which have been made from the data obtained the past year is shown in the accompanying table. In the first column, the name of the test and the name of the city in which it was given are listed. The number of pupils and the dates of administering the test are included in Table I. In some cases, the median, and in others, the mean, was used as the measure of central tendency in the earlier investigation.

The measures calculated in 1930 were in all cases the same as those available in the earlier records. The blank sections in Column 7 must not be interpreted to mean no previous instruction, but rather that no information was given.

Only a glance is necessary to discover that the evidence thus far does not justify the claim that our present high-school pupils are markedly inferior to those of previous years. In fact, many of the differences in favor of the present high-school pupils are statistically significant. In the final report of the study, the probable errors of the measures will be calculated so that the reader may determine for himself the statistical significance of the comparisons.

The success of this study in getting an answer to the question for Ohio schools generally depends upon an abundance of previous records from objective tests whether standardized or not. Such records are particularly needed in history, foreign languages, and science. The co-operation of the readers of the BULLETIN in searching for these old records should make possible an adequate collection of evidence on this project, while the publication of the final findings of the study should be useful to all who are interested in Ohio high schools.

Distribution of County High Schools

By T. C. HOLY

THREE types of high schools are provided by the school laws of Ohio, enacted in 1902. The first-grade high school normally requires four years beyond the eighth grade for completion of the course of study, and high schools of the second and third grades normally necessitate three and two years beyond the eighth grade.[1] This section of the school code gives no indication of the means whereby schools are to be classified. Another section, however, provides that the director of education shall classify high schools and issue grade certificates: "He shall issue certificates of grade to such high schools when their ratings are determined after inspection and such shall be the grades of such schools until the grade is changed or certificate revoked after a subsequent inspection or evident failure to meet standards."[2]

In compliance with these statutory provisions stating that the standards for recognizing high schools shall be determined by the state director of education, a series of bulletins setting up these standards has been prepared by the Department, the most recent one appearing in 1929. These standards set three teachers as the minimum number for a first-grade four-year high school; two for a second-grade three-year high school; and one for a two-year high school of third grade.[3]

In addition to the classification of high schools, the statutes also provide: "The school districts of the State shall be styled, respectively, city school districts, exempted-village school districts, village school districts, rural school districts, and county school districts."[4] The last three of these are under the jurisdiction of the county superintendent and constitute the county school system. In 1927-28, there were 2,151 school districts in Ohio grouped as follows: 93 cities, 48 exempted villages, and 2,010 in the county school system.

The rapid increase in surfaced roads has so enlarged the range of the school that the present situation shows too many closely located high schools in the county school districts. In

[1] Ohio. *Ohio School Laws.* Columbus, Ohio: State Department of Education, 1928. p. 335, SEC. 7652.

[2] *Ibid.*, p. 334, SEC. 7651.

[3] Ohio. *Ohio High School Standards.* Columbus, Ohio: State Department of Education, 1929. p. 32.

[4] *Ohio School Laws.* p. 101, SEC. 4679.

December, 1929, 66 per cent of the 85,000 miles of state, county, and township roads was improved with gravel, macadam, or better means of paving. At least 90 per cent of all the roads in 14 counties and 70 per cent of 36 counties were improved.[5] Because nearly a year has elapsed since the compilation of these figures, the percentage of improved roads has been increased materially.

ONE item in the annual report of high-school principals to the state director of education is a list of the three nearest high schools with the distance of each. An analysis of this item for the year 1925-26 was made by O. C. Hatton, who considered the replies of 1,001 principals. According to this report, there were at that time 22 rural and village high schools located at a distance of one mile or less from another high school, while one school reported two other high schools within a distance of one-half mile. Two hundred twenty-five of the 1,001 reported that they were within three miles of another high school, while 679 were found to be within five miles of another high school.[6] Obviously, in localities where such roads prevail, these conditions cannot be justified. Recognizing this situation, the State Department of Education during the school year 1929-30 has revoked the charters of 47 high schools, and has advised other small high schools to arrange to accommodate their pupils elsewhere.

The chief problem, so far as reducing the number of high schools is concerned, lies in the county school districts which include 93 per cent of all the school districts in the state. This fact is emphasized in one of the recommendations made in a study by J. L. Clifton, state director of education:

> That the State Department of Education discourage any increase in the number of high schools in non-urban territory in Ohio, and that in considering proposals for the location of any high schools in such territory a complete survey of the situation be made in the light of the discussion, maps, and tables of the study.[7]

The prevalence of small high schools throughout the country is shown in a bulletin of the United States Office of

[5] Ohio Institute. "A Preliminary Analysis of Rural and Village School District System of Ohio." Columbus, Ohio: Ohio Institute, 1929. p. 21.

[6] Hatton, O. C. "Distribution of High Schools in the County Districts of Ohio." 1927. CHAP. V. An unpublished Master's thesis on file in the library of Ohio State University.

[7] Clifton, J. L. *The Small Secondary School in Ohio.* Columbus, Ohio: Ohio State University, 1929. p. 113.

Education which indicates that, in 1927-28, of 18,116 public high schools, 5,512, or 30 per cent, had enrollments of less than 50.[8] Since the small high schools, practically all of which are located in the county school districts, constitute one of the chief secondary-school problems in Ohio, the distribution of high-school enrollment which follows is confined to this group of schools.

In order to have a more comprehensive picture of the scope of secondary education in Ohio, however, a consideration of the types of all public high schools for 1929-30 as shown in the *Ohio Educational Directory* is included here. The percentage of the 1,318[9] public high schools belonging to each class is given in the following tabulation:

Type of School	Percentage
First-grade four-year county high schools	50
First-grade four-year high schools in city and exempted-village school districts	8
Second- and third-grade county high schools	11
First-grade six-year county high schools	16
First-grade six-year high schools in city and exempted-village school districts	4
Junior high schools in county school districts	1
Junior high schools in city and exempted-village school districts	8
Senior high schools in county school districts	.2
Senior high schools in city and exempted-village school districts	2

Nearly 60 per cent of all the public high schools are of the first grade. Perhaps the most significant item is the number of the six-year high schools, 261 in all, 211 of which are in the county school districts. The rather rapid increase in this type is in keeping with the present policy of the State Department of Education. One hundred twenty-nine non-public high schools were recognized by the State Department of Education in addition to the public high schools classified in this table. The distribution of these high schools with reference to the population is shown in a table in the *Ohio High School Standards*[10] which for lack of space cannot be included here. Suffice it to say that the number of high schools in the county

[8] United States Office of Education. *Statistics of Public High Schools, 1927-28.* Washington: Superintendent of Documents, 1929. p. 21. (Office of Education Bulletin, No. 35)

[9] The number of high schools shown in the *Directory* is 1,323, or 5 in excess of the number given here. For the data from which the table is compiled see pages 32 and following.

[10] Table II, p. 9.

systems ranges from twenty-five in Trumbull County to four in Fayette County, or from one high school to each 24 square miles of rural area in Trumbull County to one for each 101 square miles in Fayette County.

In Table I is shown the distribution of 659 first-grade high schools in county school districts together with the per-

TABLE I

DISTRIBUTION OF FIRST-GRADE FOUR-YEAR COUNTY HIGH SCHOOLS ON THE BASIS OF ENROLLMENT

Enrollment [a]	Percentage of First-Grade County High Schools (659 Schools)	Cumulative Percentage of all Four-Year Public High Schools (765 Schools)
(1)	(2)	(3)
1- 9	.....	.....
10- 19	..... [b]	..... [b]
20- 29	2	2
30- 39	7	8
40- 49	12	19
50- 59	14	31
60- 69	11	41
70- 79	10	50
80- 89	8	57
90- 99	6	62
100-109	4	65
110-119	4	69
120-129	3	72
130-139	3	74
140-149	2	76
150-159	2	78
160-169	2	80
170-179	2	81
180-189	..... [b]	81
190-199	..... [b]	82
Above 200	5	86

[a] Median, 78.
[b] Less than 1 per cent.

centage of the total, and a cumulative percentage of the 765 four-year public high schools in the state. It will be observed from this table that 144, or 19 per cent of all of the four-year high schools in the state, had an enrollment of 49 or less. If the enrollment figure is increased to 99 or less, it will include 472 of the county first-grade high schools, or 62 per cent of all the four-year high schools in the state. The median

enrollment of the high schools shown in this table is 73 with the mode falling between 50 and 59.

According to the state-aid salary schedule which operates in more than seven hundred school districts of the state, 97 per cent of which are county school districts, a three-teacher first-grade high school should accommodate up to 75 high-school pupils, or approximately the median size of the county first-grade high schools. The approximate total enrollment of the 345 first-grade county high schools having an enrollment of 75 or less, is 18,125. If each of these schools had the maximum enrollment of 75 according to standards of the State

TABLE II

DISTRIBUTION OF SECOND- AND THIRD-GRADE HIGH SCHOOLS IN COUNTY DISTRICTS

Enrollment	Percentage of Second- and Third-Grade County High Schools (140 High Schools)	Percentage of all Public High Schools in the State (1,318 High Schools)	Enrollment	Percentage of Second- and Third-Grade County High Schools (140 High Schools)	Percentage of all Public High Schools in the State (1,318 High Schools)
(1)	(2)	(3)	(1)	(2)	(3)
1- 4	.....	.....	30-34	16	2
5- 9	3	.....[a]	35-39	8	1
10-14	9	1	40-44	9	1
15-19	19	2	45-49	1	.....[a]
20-24	17	2	Above 50	7	1
25-29	11	1	Total	100	11

[a] Less than 1 per cent.

Department of Education, an additional 7,750 pupils could be accommodated without extra teachers.

The effect of increasing the teacher-pupil ratio in the county high-school districts to 28, the figure obtaining in large city high schools of the state, has been estimated in the previously mentioned study by the Ohio Institute with the following comment:

> Had the children in county districts been enrolled in high schools which were able to maintain a pupil-teacher ratio as high as that maintained in the schools enrolling from 200 to 299 pupils, the high-school teaching force in rural and village districts might have been reduced 1,000, or 20 per cent.[11]

The distribution of the 140 second- and third-grade high schools in operation in 1929-30 is shown in Table II. These

[11] Ohio Institute, *op. cit.*, p. 10.

must have a minimum of two teachers and one teacher, respectively. Ninety-one of these schools are second grade and 49 third grade. On the basis of these figures, at least 231 teachers would be required. If 25 pupils per teacher be accepted as the standard, the ratio used in dealing with state-aid districts, this number of teachers could accommodate 5,775 pupils, or approximately 1,800 more than the present enrollment. On the other hand, on a ratio of 25 pupils per teacher, the present enrollment in high schools of second and third grade could be cared for by 160 teachers, or approximately two-thirds of the number now employed. Attention should be directed to

TABLE III

DISTRIBUTION OF FIRST-GRADE SIX-YEAR HIGH SCHOOLS IN THE COUNTY SCHOOL DISTRICTS

Enrollment[a]	Percentage of First-Grade Six-Year High Schools (211 Schools)	Percentage of all Public High Schools in the State (1,318 Schools)	Enrollment[a]	Percentage of First-Grade Six-Year High Schools (211 Schools)	Percentage of all Public High Schools in the State (1,318 Schools)
(1)	(2)	(3)	(1)	(2)	(3)
1- 19	.....	.....	180-199	6	1
20- 39	.....	.....	200-219	6	1
40- 59	.....	.....	220-239	3	.....[b]
60- 79	5	1	240-259	8	1
80- 99	10	2	260-279	2	.....[b]
100-119	11	2	280-299	1	.....[b]
120-139	18	3	300-319	1	.....[b]
140-159	15	2	Above 320	4	1
160-179	10	2			
			Total	100	16

[a] Median, 149.
[b] Less than .5 per cent.

the excessive cost of maintenance and operation of numerous small school units as well as to the teaching cost. Many comparisons of this character have been made, all of which indicate the operating economy of larger school units.

Table III shows the distribution in the county school districts of the 211 first-grade six-year high schools with a median enrollment of 149. The provisions of the *High School Standards* require at least five teachers for a six-year high school.[13] Thus on the basis of 25 pupils per teacher there should be an enrollment of 125 in each school. The 64 schools of this group which have an enrollment of less than 125 had a total

[13] *See* p. 32.

enrollment of approximately 6,700, whereas on the pupil-teacher ratio of 25 they should have an enrollment of 8,000, or 1,300 more pupils than they actually had. Obviously, then, 1,300 more pupils could be accommodated in these schools without additional teachers or the number of teachers could be reduced by approximately 50 if the units were large enough to maintain the pupil-teacher ratio of 25.

In addition to the various types of high schools listed in the foregoing tables, there are in the county school districts 17 schools classified as junior high schools with a median enrollment of 88. Since another requirement of the *High School Standards* provides that there shall be three teachers for a junior high school,[13] at least 264 were employed in these schools. The seven schools having an enrollment of less than 75 actually enrolled 312, or approximately 200 less than they should have on the basis of 25 students per teacher. There are also two senior high schools, one of which enrolled between 100 and 150 and the other between 400 and 450.

Summarizing, then, if the first-, second-, and third-grade four-year high schools, the six-year high schools, and the junior high schools in the county system whose enrollments are such that a ratio of 25 pupils cannot be maintained were to increase their enrollment to that ratio there could be accommodated at least 7,750 additional pupils in the four-year high schools, 1,800 in the second- and third-grade high schools, 1,300 in the six-year high schools, and 200 in the junior high schools, or a total of 11,050 pupils without additional teachers. Expressing this number of pupils in terms of teachers on the ratio of 25 pupils it means that there are at least 442 more teachers employed than enrollments on that basis would require. The situation with respect to these small high schools in the county school system is recognized by the State Department of Education where steps are being taken to reduce their number as rapidly as conditions permit.

[13] *See* p. 32.

Ability Grouping in the Ninth Grade

By T. C. HOLY AND D. H. SUTTON

THE conflicting results, obtained in studies in which students of similar ability have been grouped together for instruction, emphasize the need of further experimentation. The Bureau of Educational Research in 1928-29 undertook an investigation of this sort with the cities of Dayton, Marion, and Springfield co-operating. The results from but one of these cities, from Marion, are reported here.[1] A brief description of the experimental arrangement follows. One hundred forty-eight pupils in the second semester of ninth-

TABLE I

RANGE OF ABILITY IN THE HOMOGENEOUS AND HETEROGENEOUS GROUPS EXPRESSED IN INTELLIGENCE QUOTIENTS

Class	Mean	Standard Deviation	Range of Intelligence Quotients	Number of Pupils
(1)	(2)	(3)	(4)	(5)
	Homogeneous Group			
Fast	118	2.69	113-122	26
Average	104	2.15	98-109	23
Slow	89	3.78	83- 95	22
	Heterogeneous Group			
First	111	12.57	90-133	25
Second	108	12.27	83-127	26
Third	105	9.66	86-125	26

grade algebra were divided into six groups in terms of the scores obtained on the Otis Group Intelligence Scale: fast, average, and slow groups of like intelligence quotients and three similar groups arranged with no attempt at homogeneity. The three so-called "heterogeneous groups" were arranged keeping the span of intelligence scores about the same (*see* Column 4, Table I). In the grouping of these students, slight differences in the mean ability of the three groups was made so that the mean intelligence of the first class is 112; that of the second, 108, and that of the third, 105. These pupils were all taught

[1] The investigator wishes to express his appreciation for the excellent co-operation extended by Mr. W. E. Orcutt, principal of the Central Junior High School where the experiment was carried on, and Mrs. Struthers, who taught the six classes.

by the same teacher so that no problem arises in connection with instruction.

In Table I is shown the mean intelligence quotient, standard deviation, range of scores, and number of pupils in each of the six sections. The differences in the mean intelligence quotients of the fast and average, and average and slow homogeneous groups are approximately 15, while those of the three heterogeneous groups are 3. The classes ranged in size from 22 in the slow homogeneous to 26 in three of the other groups.

At the beginning of the second semester, these six classes were given the Hotz Algebra Scale, Series A; the Douglass Standard Diagnostic Test for Elementary Algebra, Test I,

TABLE II

MEAN SCORES ON INITIAL AND FINAL TESTING

	INITIAL TEST		FINAL TEST		DIFFERENCE	STANDARD ERROR OF DIFFERENCE
	Mean	*SD*	Mean	*SD*		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Holz:						
Homogeneous . .	22.71	4.78	30.29	7.64	7.58	1.30
Heterogeneous . .	22.69	4.57	29.47	7.87	6.78	1.32
Douglass:						
Homogeneous . .	23.60	5.86	30.91	4.89	7.31	1.09
Heterogeneous . .	23.10	5.75	26.29	5.91	3.19	1.19
Illinois:						
Homogeneous . .	31.96	15.41	52.58	16.53	20.62	3.26
Heterogeneous . .	32.33	13.24	52.33	15.92	20.00	2.99

Form A; and all four forms of the Illinois Standardized Algebra Test. At the end of seventeen weeks of instruction, corresponding forms of these tests were again administered. In order to take into account such differences as might be due to reciting at different times of the day, the class periods were arranged in the following order: first period, average homogeneous; second period, first heterogeneous; third period, third heterogeneous; fourth period, slow homogeneous; fifth period, second heterogeneous; sixth period, fast homogeneous. Administrative problems made it impossible to alternate these groups.

A plan of pairing was arranged based on the assumption that even though these pupils were grouped on the basis of intelligence quotients, there was no assurance of comparable mathematical ability. An examination of the initial scores on

the Hotz test, for example, showed that some students ranking among the highest 10 per cent in intelligence quotients were in the lowest 10 per cent of the scores on this initial test. In order, therefore, to make the homogeneous and heterogeneous groups comparable on both intelligence and mathematical ability as determined by the scores on the initial Hotz test, they were paired by these two criteria. This was done in the following manner. The three groups in both the homogeneous and heterogeneous classifications were thrown together. From these two groups 48 pairs of students were arranged. In each pair the difference in intelligence quotients did not exceed 5 points, and the variation in scores on the initial Hotz test was not more than 1 point. These 96 students, 48 of whom were taught in homogeneous groups and the others in heterogeneous groups, were used as the basis of determining whether difference of achievement in ninth-grade algebra could be found which resulted from the grouping used in the experiment.

The mean scores on the initial and final testings, the differences of the averages, and the reliability of the differences for the homogeneous and heterogeneous groups are given in Table II. Since one of the criteria in the pairing was the scores made on the initial Hotz test, one would expect, of course, that the means for that test would be practically identical. Although the students were paired on the results of the Hotz test, the means scores on the initial Douglass and the Illinois tests for each of the groups are similar. In the case of the Douglass test, the mean on the homogeneous was 23.6 and that of the heterogeneous was 23.1, while on the Illinois test the means were each 31.96 and 32.33 respectively. It would appear, therefore, from these figures that the pairing on the results of the Hotz test was equally valid on each of the other tests.

In every case except the record of the heterogeneous group on the Douglass test, the difference between the initial and final scores was more than 3 times its standard error indicating that these gains in ninth-grade algebra were significant. This is simply a verification of one's expectation that the average achievement of a group of students after a semester's work would be appreciably higher than their average achievement at the beginning of the semester. Evidently the scaling of these tests was sufficiently small to indicate a gain during one semester.

Since the purpose of the experiment was to compare the

relative achievement of the members of the pair taught in the homogeneous group with that of the members of the pair taught in the heterogeneous group, the difference between the final score and initial score was computed for each student. In Column 2 of Table III the average gains for the students who were instructed in the homogeneous groups may be compared with those of the students in the heterogeneous groups. The differences of the average gains, computed by taking the gain of the heterogeneous from that of the homogeneous group, are given in Column 4. In the last column of the table, the standard error of each difference in gain is listed. Only one of the

TABLE III

AVERAGE GAINS IN FINAL SCORES OVER INITIAL SCORES FOR THE PAIRED MEMBERS OF EACH GROUP

	Mean Gain	*SD* of Mean Gains	Difference of Gain H_o-H_e	Standard Error of Difference
(1)	(2)	(3)	(4)	(5)
Hotz:				
Homogeneous	7.58	5.44	.80	1.10
Heterogeneous	6.78	5.34	.....	.....
Douglass:				
Homogeneous	7.31	4.18	4.12	.98
Heterogeneous	3.19	5.36	.....	.....
Illinois:				
Homogeneous	20.62	10.45	.62	2.22
Heterogeneous	20.00	11.30	.....	.....

standard errors, that of the Douglass test, indicates a reliable difference; that is, the difference is more than three times its standard error. All of the gains are in the same direction, in favor of the homogeneous group, although only one of them is highly significant. One seems justified in concluding, therefore, that there is a noticeable difference toward homogeneous grouping, but whether it is equivalent to one, two, three, or more weeks of instruction would require tests of greater exactness of measurement than these used.

The reader will recall that this is a record of but one portion of the results obtained in this study. When the reports for the students from the three cities are combined the conclusion obtained in this "progress report" may be more convincingly expressed by the statistical measures computed from more extensive data.

What Are Percentiles?

By R. L. MORTON

RECENTLY, the writer heard a psychologist in a public address refer to the "top ten percentile" of a distribution. This psychologist is a statistician of considerable prominence and, undoubtedly, knows better. His careless use of the term "percentile" was probably induced by hearing other psychologists and educators employ the term in this manner.

An article in an educational periodical refers in its title to the "first decile of college Freshmen." (Unfortunately, a typographical error made the word appear *docile* instead.) Many speakers and some writers continually make references to the lowest quartile of a class, the second quintile of a distribution, and the like. As we shall see, these terms are not properly employed in this manner.

Percentiles are *points* not *ranges*. The 10-percentile, for example, is the theoretically determined point on a scale below which 10 per cent of the distribution lies. It is a theoretically determined point because of the assumption which we make regarding the distribution of the scores in an interval. The scale on which this point lies is the scale employed as an instrument of measurement in collecting the data.

All percentiles, including deciles, quintiles, quartiles, and the median, are points. It is then impossible for an individual to be "in the first quartile," or "in the top decile." We might as well speak of an individual as being *in* the median. The expression "top ten percentile" is meaningless. If the top 10 per cent is meant, why not say so? Instead of talking about quartiles of a class as parts of a class, let us say "quarters" or "fourths." Likewise, we should say "fifths" if we mean fifths, and "tenths" if we mean tenths. Quintiles are percentiles which are multiples of 20; deciles are percentiles which are multiples of 10. They are points which divide the distribution into fifths and tenths, respectively.

The careless use of the language of statistics misleads the young student. If one speaker uses the term "third quartile" to designate the point separating the lower three-fourths of the distribution from the upper one-fourth, while another speaker, perhaps on the same program, employs this expression to indicate those individuals lying above the median but below

the 75-percentile, confusion of interpretation on the part of the listeners is to be expected.

Textbooks in statistics indicate clearly that percentiles are points. Kelley says, "The 10-percentile is the value below which 10 per cent of the measures lie." Odell talks about tertiles, quintiles, deciles, and percentiles, and the "calculation of these . . . points." Garrett speaks of the "decile points" and other "percentile points." Holzinger defines a percentile as "a value of the variable below which a given per cent of the frequencies lie." Thurstone refers to "quartile points," and uses these measures entirely as points. Mills says that quartiles "are points on the scale which divide the entire number of measures into four equal groups." Chaddock refers to the various percentiles as "values." In the language of Chambers, "the deciles separate the whole range into ten intervals." Crum and Patton state that "the quartiles divide the array into sections each of which contains one-quarter of the total frequency." Finally, we read in Lovitt and Holtzclaw that "percentiles are those values of the variable which divide the entire frequency into one hundred equal parts."

In this day, it is more or less fashionable to use the language of statistics. Statistical language is frequently used, however, when a better-known, good old-fashioned term correctly expresses the intended meaning. The man who says "lowest quartile" when he means "lowest fourth" probably does not know the meaning of the word "quartile." Is it possible that he is affecting an educational "highbrow"?

In some quarters an effort is being made to substitute the word "centile" for percentile. There is little evidence that this effort is meeting with success.

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Auditorium-Gymnasium Facilities

By A. W. SHIELDS AND T. C. HOLY

THE *Ohio High School Standards* provides that "every first-grade high school must have a gymnasium of standard size," and that "every first-grade high school must have an auditorium." In the case of the former, some exemptions may be allowed, while in the case of the latter,

"schools which show reason, satisfactory to the Department, for inability to comply with this requirement may have exemption from it to 1935."[1]

This study of these facilities in county high schools was undertaken not only to determine the extent to which boards of education of Ohio are providing auditorium-gymnasium facilities for high schools under county supervision, but also to class these facilities by a variety of significant features. Facts of location, of type of school organization and enrollment, of the use of them both for school and for non-school activities,

TABLE I

DISTRIBUTION OF AUDITORIUM-GYMNASIUMS IN CERTAIN HIGH SCHOOLS IN THE COUNTY DISTRICTS OF OHIO ACCORDING TO TYPE

Types of Auditorium-Gymnasiums	Number of Schools	Percentage of Schools
(1)	(2)	(3)
Combination with seats all on floor level	148	29
Combination with seats on floor and balcony	138	27
Combination using stage of auditorium as a gymnasium	11	2
Separate auditorium and gymnasium	107	21
Auditorium alone	24	5
Gymnasium alone	16	3
Other types	25	5
Neither auditorium nor gymnasium	44	8
Total number of schools	513	100

and of the general administrative policies with respect to them were gathered.

In October, 1929, an inquiry was sent to the 651 high schools having enrollments of 50 or more pupils which were under county supervision during the school year 1928-29. Usable returns were submitted by 513 schools, or 79 per cent. The data have been classified under separate headings, but lack of space prevents the inclusion of more than one of those divisions. Table I shows the distribution of auditorium-gymnasiums according to type. The first type, including combination auditorium-gymnasium with the seats all on the floor level, is the

[1] *Ohio High School Standards.* Columbus, Ohio: State Department of Education, 1929. p. 34.

predominate type with 148 schools, or 29 per cent of the total. It will also be noted from the table that 44, or 8 per cent of the entire group, have neither auditorium nor gymnasium facilities and are therefore not complying with the requirements of the high-school standards.

Schools having enrollments of less than four hundred usually have a combination auditorium-gymnasium. The median hours of use per week in the 469 schools having such facilities for school activities only, was 22.2, while that for outside organizations was 1.7 hours per week. Four hundred four, or 88 per cent of all the schools having these facilities, report some community use. Most of these make a nominal charge ranging from $5 to $10. The janitor is paid an extra fee for opening the building for outside activities in 53 per cent of the schools, the other 47 per cent making no provision. The rate for this service was usually from $1 to $2 for each occasion.

It will be seen from these figures that a large proportion of the high schools under county supervision are complying with the requirements of the high-school standards in the matter of auditorium-gymnasium facilities. Other aspects of the study also indicate a wide difference in policies of various boards of education with respect to the amount and character of the use of such facilities. [Vol. IX, No. 15]

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One hundred fifty thousand schools are being reached by the Damrosch Music Appreciation hours according to data collected by the National Broadcasting Company and reported in the September issue of *Teachers Journal and Abstract*. Eight state departments of education report that radio is being used for educational purposes, although they are generally not as comprehensive as the Ohio School of the Air, which furnishes daily a one-hour organized program to schools.

Radio equipment was reported in 1,606 schools by the 635 school superintendents who answered questionnaires sent out by the National Advisory Committee on Education by Radio. Other results of the survey show that 77, or 12.3 per cent, of the 672 licensed broadcasting stations are owned and operated by educational institutions. From the results of the survey, the committee recommends the establishment in the Office of Education of a section devoted to education by radio.

EDITORIAL COMMENT

All Is Not Lost

A FRANK critic of the professional training of teachers in colleges of education recently made the bold and embarrassing statement that the reason for the decreasing ability of students entering the Ohio State University from the Ohio high schools lay in the fact that the "soft pedagogy" of the College of Education was now beginning to be felt in the high schools, through the inferior work of graduates of that college. Naturally interested in the criticism, we decided to investigate two questions, "Is the College of Education to blame for the decrease?" and "Is ability decreasing?"

To answer the first question, Mr. Anderson, director of the Appointments Division, ascertained the proportion of the graduates of the College of Education who are teaching in Ohio high schools. He found that of the more than seven thousand teachers, approximately one thousand were graduates of the college. One might say in rough numbers that only one-seventh of the entering students came in contact with our graduates. Or more accurately, we can say that only one-seventh of the courses studied in high school by students entering the University were taught by the graduates of the College. Respecting the ability of our graduates as we do, we nevertheless are not able to believe that their influence is so potent that they can be held accountable for all of the unsatisfactory work done in high schools.

The second question was studied by Mr. Tyler, whose report appears in this issue. He found the situation to be that which would be expected by those who have followed the literature on the subject for the last twenty years. From the time of the Springfield episode to the present, studies show a gradually increasing improvement in the scores of children of today, when subjected to the same tests as the children of yesterday. An examination of the tables in Mr. Tyler's article shows that, on the whole, the children of 1930 made better scores on such objective tests as he could collect, than did the students of from five to ten years ago, and that some of the favorable differences were quite significant. The study indicates at least that the

entering Freshmen in 1930 are not inferior to those of an earlier college generation, in so far as these tests are valid measures of achievement.

So we may conclude for the present, until more exhaustive data can be collected, that the critic is mistaken. The College of Education is not wholly responsible for any success or failure of high-school students in the state, and these high schools are not doing less effective work than they used to do.

Incidentally, one wonders what is done with the records of the thousands of standardized tests that are given every year in Ohio. They are difficult to locate, and unfortunately so. The question of increase or decrease in the efficiency of the schools is a matter of such vital public concern that ample records should be zealously preserved.

W. W. C.

THE tests used in the study of class-size in the elementary school made by P. R. Stevenson and sponsored by the Bureau of Educational Research seemed to measure information, and the conclusion may be interpreted to mean that elementary-school pupils gain information as efficiently in large classes as in small. The study of size of class in the high school made by Mr. Stevenson, while at the University of Illinois, and the study of Mr. Hudelson at the University of Minnesota seem to indicate similar conclusions for the efficiency of learning on the part of high-school students and university students.

The members of the Bureau of Educational Research have not been content to accept the problem as solved. Mr. Tyler with certain university classes in botany and zoölogy is devising tests that measure other capabilities than information-getting. Happening to contrast records from similar classes with enrollments of twenty-five and one hundred twenty taught by the same teacher, he found that instruction in small classes showed decidedly favorable results in certain other types of achievement. The incidental findings of one experiment prove nothing, but they suggest an interesting avenue for further research.

Then, too, there is the opinion that such administrative features as teaching-load and instruction in classes of similar ability may be influencing factors. Mr. Holy has set up two experiments in which these features are made predominate one of which is reported in this issue of the BULLETIN.

READINGS

AYER, FRED C., AND HENDRICKS, JAKE J. "Analyzing Duties of Superintendents of Small Schools," *Nation's Schools*, VI (September, 1930), pp. 55-59.

This study attempts to determine the most important task of the administrative heads of small school systems, through information secured from a study of forty-seven administrative duties as performed by 50 per cent of all the superintendents of small school systems in Texas. The results of this study show that all but four of the duties in the original list were performed by more than 75 per cent of the superintendents replying. The duties consuming most of the time were: board meetings, organization of school departments, study and influences of board policies, assigning duties to teachers, and preparing rules and regulations. Other duties which consumed a considerable portion of their time were clerical work such as ordering school supplies, plans for schoolgrounds, arranging salary schedules, selecting textbooks, and attending educational meetings. It was found that size of school influences greatly the types and duties of administrative officers; that the larger the school the greater number of duties delegated to principals; that suitable office equipment effects more efficient administration; and that superintendents of small school systems give too much time to minor details.

HILL, CLYDE M., AND SNYDER, GLADYS L. "Curricular and Extra-curriculum Possibilities of Journalism in Secondary Schools," *School Review*, XXXVIII (October, 1930), pp. 85-97.

Journalism is an activity which forced its way into the schools and was given the title of "extra-curriculum activity." Today in Southern California, its place is well established in the curriculum of the secondary school. The training of teachers in journalism is on the way. Some teachers who have been trained for the purpose are already in the schools. Interest is readily secured by the fact that pupils generally have reasons for entering the course and have a conscious purpose. The journalism courses have been evaluated by asking individual pupils to state specifically the benefits that they have received. The present tendency is to give journalism, as one of the extra-curricular activities, more and more recognition and consideration as a part of the secondary-school curriculum.

PAYNE, W. L. "Methods in Teaching How to Study," *School Review*, XXXVIII (October, 1930), pp. 598-604.

This article describes a plan of supervised study which is being used in the Lyons Township High School, at La Grange, Illinois. In this procedure the pupils receive assistance in study in their regular classes and in their study periods. Five methods used by one supervisor of the study groups are explained. The case-study method is the significant feature of discovering and correcting faulty habits of pupils of poor scholastic attainments. The plan is evaluated on the basis of these encouraging results: Many pupils have overcome difficulties in studying; many have made up deficient work; pupils

who made habitual failures have changed their attitude toward life; and the rate of failure in Lyons Township High School has been substantially lowered.

EIKENBERRY, D. H. "The Professional Training of Secondary School Principals," *School Review*, XXXVIII (September, 1930), pp. 498-509.

According to this investigator, the goal toward which teacher-training institutions and state departments of education should strive is complete training before the principalship is entered. He holds that the work of the high-school principal is sufficiently important to justify professional training on the graduate level, preceded by at least two or three years of successful teaching experience in the secondary field. The writer proposes sixteen courses, classified under three divisions. The first group consists of fundamental courses, while the other two classifications include courses dealing specifically with the work of high-school principals and superintendents.

HIRSCH, EVERETT C. "The Case Method of Dealing with Individual Difficulties in the Secondary School," *School Review*, XXXVIII (September, 1930), pp. 525-31.

At Rice Lake, Wisconsin, the case method of analysis of high-school students and a system of making provisions for the proper treatment of their individual difficulties has been utilized. The distinguishing characteristic of the plan is that students are given ample opportunity for self-help both in the analysis and in the remedial follow up. The article contributes a complete classification of causes and presents an interesting case-study questionnaire.

POWERS, SAMUEL RALPH. "Educational Values of Science Teaching," *Teachers College Record*, XXXII (October, 1930), pp. 17-33.

The interest of children in the natural setting of their lives provides a motivating force which is always desirable. In practice, the program of education in science must be consistent with the plan of general education. Mr. Powers defines three educational values from science today, the acquisition of "an ability to utilize the findings of science that have application in their own experiences"; "an ability to interpret the natural phenomena of their environment"; and "an understanding of, and ability to use, some of the methods of study that have been used by creative workers in the field of science." The article shows the importance of applied science in the modes of living of today.

Books to Read

WEST, MICHAEL. *Language in Education.* Calcutta, India: Longmans, Green and Company, 1929. v + 177 pp.

Despite its rather psychologically general title, *Language in Education* is a very specific book. In it, its author, who is Principal of the Teachers' College, Dacca, India, discusses in detail the teaching of English in India to Indian children. The book is, then, a methods text in foreign-language instruction.

The first chapter of the book pictures once more the kinship of language and thinking and of language and doing. This chapter is called "Aphasia in

Education." The need for improved English instruction in India is next discussed; and the faults and dangers of the present condition of affairs as seen by Dr. West are depicted. The remainder of the book is specifically devoted to the psychology of reading, the teaching of reading, the teaching of speech and writing, the pronunciation of English, and examinations in foreign-language teaching. Throughout these chapters the author presents means and devices, illustrates them fully, and suggests methods for their employment.

While the proposals made by Dr. West relate to a very definite situation, none the less these proposals seem soundly based psychologically, socially, and educationally. Consequently, this reviewer feels certain that the book contains principles and methods that should interest the American teacher of foreign languages and help him with certain of his problems.

HOWARD FRANCIS SEELY

MATTHIAS, EUGEN. *The Deeper Meaning of Physical Education.* Translated by Carl L. Schrader. New York: A. S. Barnes and Company, 1929. xii + 88 pp.

ROGERS, FREDERICK RAND. *Educational Objectives of Physical Activity.* New York: A. S. Barnes and Company, 1929. 109 pp.

The reviewer finds the meaning of physical education, as set forth by Dr. Matthias, not only deep but quite obscure. The theme of the book is that physical education is not merely "an anatomically functioning muscle exercise," but a means of expression that contributes to the development of the entire integrated personality, for "to carry on bodily exercise without experiencing the stirring of one's soul is really quite impossible." Mr. Shrader's translation has an awkward style due to a too modest desire to give a literal translation.

Educational Objectives of Physical Activity includes fifty-five pages of text and thirty-six pages of book reviews. The text emphasizes the conception of physical education as a method of education—education through physical activities. Under the heading "Implications," opinions are stated, and advice on various phases of physical education is given to teachers and school administrators. The book reviews are good, but the author seems to strain a point in including such authors as Bury, Spengler, and France.

D. HINDMAN

GARRETSON, OLIVER K. *Relationships between Expressed Preferences and Curricular Abilities of Ninth Grade Boys.* New York: Teachers College, Columbia University, 1930. 77 pp. (Teachers College, Columbia University, Contributions to Education, No. 396)

Ninth-grade pupils enrolled in the academic, technical, and commercial courses in several New York City high schools were asked to fill out questionnaires concerning their preferences for certain vocations, activities, ownership of various articles, magazines, school subjects, human qualities and abilities, and the like. A scoring key, designed to distinguish between pupils of different curricular inclinations was used to tabulate scores. The responses of one hundred fifty students whose marks were above the mean scores in the differentiating subjects of the various curriculums were selected for special study.

When the "critical scores" on the preference tests were correlated with

school marks, the results were so low as to lead the author to conclude that "the relation is too slight to be of value in the prediction of the degree of curricular success." When objective tests were substituted for school marks, the correlations were even lower. As an explanation, the author ventures the supposition that the "degree of preference may also appear in the attitude of the pupils and thereby to a degree affect the subject marks given by the teacher." The author reaches the general conclusion that there is little relationship "between inclination toward and ability in a curriculum."

H. B. ALBERTY

COLLINS, LILLIAN FOSTER. *The Little Theatre in School.* New York: Dodd, Mead and Company, 1930. xi + 271 pp.

The announced purpose of Miss Collins' book is to show "how a children's theatre incorporated in the course of study as a regular and active part of the school curriculum . . . can be established . . . and to enumerate the incalculable benefits that accrue through its establishment." Although Miss Collins' expressed aim gives some unity to her treatment, the book seems in the main a general repository for the fruits of her experience in the teaching of junior high-school dramatics. The first quarter of the book, which deals with play production, is scanty in detail, except for the chapter on plays suitable for production in the junior high school and the section on costuming. The second quarter of the book contains a detailed outline of a method for the joint writing (or adapting) of an original play by a class in dramatics. The rest of the book contains the texts of four plays "written with children," which not only are interesting and usable, but are evidence of the success of the author's method.

The comparatively inexperienced director of high-school dramatics will find valuable suggestion and information in this book; the experienced director will probably wish to have it in his library for the plays it contains.

JAMES F. FULLINGTON

HAYES, WAYLAND J. *Some Factors Influencing Participation in Voluntary School Group Activities.* New York: Teachers College, Columbia University, 1930. vi + 82 pp. (Teachers College, Columbia University, Contributions to Education, No. 419)

A universal problem in the administration of extra-curricular activities is the participation by students in such wise as to secure optimum results. Recognizing this problem, Dr. Hayes sets out to promote its solution by uncovering the major factors which condition participation in voluntary group activities.

A New Jersey high school enrolling 356 students was selected for special study. On the basis of the information given by diaries kept by 314 pupils accounting for the use of all their time for six days, careful analysis was made of the relation between personal traits and participation and between group characteristics and participation. The measures of participation were two: the number of memberships and the amount of time spent in activities.

The author discovered that extra-class school activities are in general selective as to intelligence and social status, but that athletics are less selective in these respects than other activities; that students who work after school or

attend to community interests do not participate largely in school activities; and that girls participate more than boys in the first two years, indicating earlier social maturity. One suggestion growing out of this study is that it might be desirable to evaluate community activities prior to the formulation by the school of a program of extra-curricular activities.

FRANK P. WHITNEY

CLEVELAND CONFERENCE FOR EDUCATIONAL CO-OPERATION. *Cleveland Student Life.* Cleveland, Ohio: Cleveland Conference for Educational Co-operation, 1930. 179 pp.

The Cleveland Conference for Educational Co-operation was organized March 25, 1924, for the purpose of obtaining functional unity of the educational process in Cleveland through co-operation of all of the educational activities of the community. For several years the Conference has had in preparation, under the direction of Dean Henry Turner Bailey, a book that would portray the rich educational advantages of Cleveland and that would have guidance value for high-school boys and girls in Cleveland and vicinity. *Cleveland Student Life,* recently published, marks the accomplishment of this objective. One chapter presents a series of short descriptions of nineteen agencies engaged in educational work.

Following chapters discuss these subjects: opportunities for scholarships and self-help; living arrangements and costs; the possibilities of the museums; music, dramatic, literary, and religious advantages; and athletic and recreational possibilities. This book is frankly a boost for Cleveland, but it is well written and unprejudiced, and it places the emphasis unequivocally upon culture and scholarship. Although the usefulness of this particular book is confined to the students of Cleveland, for whom it was written, the reviewer feels that it contributes a technique and a standard that would bear repetition in many communities.

C. W. HALL

CRAWFORD, C. C. *Studying the Major Subjects.* Los Angeles, California: The Author, University of Southern California, 1930. xiv + 384 pp.

CRAWFORD, C. C., AND LEITZELL, EDNA MABLE. *Learning a New Language.* Los Angeles, California: The Author, University of Southern California, 1930. xii + 242 pp.

These books are largely a compilation of methods of study secured by the interview method from scholars and superior students. Emanating from these sources, the methods presented are detailed and concrete. The materials, therefore, are more suggestive for practice than are the methods usually found in how-to-study texts which are expositions of facts and principles of the learning process.

The books are intended for use by high-school students in how-to-study courses. The former of the two texts deals with methods of studying literature, composition, foreign languages, mathematics, physics and chemistry, biology, history, other social studies, the practical arts, physical education and health, and the fine arts. The latter text treats more intensively the techniques of studying the foreign languages and deals with such topics as learning

to think in a foreign language, learning pronunciation, vocabularies, and spelling, and the like. The reviewer believes that the texts will be of definite practical value for high-school students.

W. W. CHARTERS

BEATTIE, J. W., MCCONATHY, OSBOURNE, AND MORGAN, RUSSEL V. *Music in the Junior High School.* New York: Silver, Burdett and Company, 1930. vi + 250 pp.

Music education in the junior high school has been retarded by lack of a better understanding of the problems confronting the teacher of music. Here is a book that fills this need by setting forth a historic survey of the junior high school and comparing music under the 8-4 and 6-3-3 plans. It gives authoritative and accurate information in regard to the characteristics of adolescents, and tells how music should be selected to meet the needs of youth of this interesting age. The book explains what constitutes a modern, well-balanced program in all phases of music teaching. Administrators may well use this text when planning their courses of study, and instructors of musical education will find here a text that furnishes excellent material, written in a stimulating style for use in training the prospective music teacher.

JOSEPH A. LEEDER

HALL, HERMAN S. *Trade Training in School and Plant.* New York: Century Company, 1930. xxiii + 500 pp.

STRUCK, F. THEODORE. *Foundations of Industrial Education.* New York: John Wiley and Sons, Inc., 1930. xiii + 492 pp.

Readers of this volume of Mr. Hall's who are familiar with the book by Charles R. Allen, *The Instructor, the Man and the Job,* published by Lippincott in 1919, will be struck at once with the similarity of the two books, both in content and in method of presentation. In fact, many may be moved to wonder whether the author and the editor of the new publication have been liberal enough in recognition of this similarity. *Trade Training in School and Plant* contains much wholesome theory and many sound psychological principles not found in the earlier work, and also a multiplication of simple forms and tables of workbook character intended to assist the reader to a clearer understanding of principles. But the techniques of trade analysis and organization of instructional materials, upon a work-job basis, as well as the four-step modification of Herbartian method, are so little changed in this volume from those of the earlier work as to appear substantially the same. On the whole, however, the new volume represents an advance toward a more professional procedure in industrial education.

The book written by Mr. Struck is, on the whole, a satisfactory presentation of principles foundational to the whole field of industry in education. The essential integrity of industrial education in both arts and vocational phases has been too generally ignored, even sometimes resented, notably by specialists in the latter area, and the author of this volume has performed a major service in presenting them in proper relationship and under proper terminology, even if the one is inadequately developed.

WILLIAM H. STONE

NEW TESTS

THE junior American History Test has been designed by H. J. Carman, T. N. Barrows, and Ben D. Wood, all of Columbia University, to provide an objective test for junior high-school American history. It is published by the World Book Company, Yonkers-on-Hudson, New York. The items of the test have been chosen on the basis of the authors' judgments as to the relative importance of the topics treated. A preliminary administration indicates that it is sufficiently reliable to be used to determine the achievement or progress of the individual pupils as well as to measure the accomplishments of the entire class. Norms which were obtained from the marks of four thousand seventh-grade pupils are given.

Since no evidence regarding the validity of the test is presented, this may well be brought into question. No attempt apparently was made to select the items on the basis of objective criteria, and, although the authors claim that it measures other things than memorized facts, an examination of the test items indicates that most of the exercises probably measure only information. Teachers of American history may wish to try the test, judging its usefulness in their own classes.

ANOTHER mathematics test, the Orleans Plane Geometry Achievement Test, prepared by Joseph B. and Jacob S. Orleans, has been published by the World Book Company, Yonkers-on-Hudson. A separate test is provided for each semester's work. The authors have determined the validity by comparing the test results with the marks given the same pupils by ten different teachers. The correlations vary from .66 to .88, the median being .81. This is unusually high for the correlation of an objective test with teachers' marks. It indicates that the test measures very nearly the same abilities that teachers consider in grading pupils in geometry.

One significant feature of the test is inclusion of items requiring several different types of ability. One part measures ability to select appropriate reasons in the proof of a proposition; another measures the ability to use geometric theorems in computing the size of angles and arcs and the length of lines. The ability to make constructions and to formulate proofs is

also measured. The authors report a reliability of .85, which indicates that the test may be used to determine the progress of the class as a whole, but it can hardly be used alone as a measure of the achievement of individual pupils.

ANOTHER book of self-directive exercises and tests has recently appeared on the market. This is Exercises and Tests in Algebra, by D. E. Smith, W. D. Reeve, and E. L. Morss published by Ginn and Company, Boston. No data are presented with reference to the selection of these materials, but it is probable that they represent practice exercises to accompany the Smith and Reeve textbooks. The value of the series, as with other exercises of a similar sort, lies in the provision of additional practice materials which can be checked without the use of the teacher's time. The exercises have been classified into groups so that a student may determine for himself his specific weaknesses and continue his practice on those items.

A CLEAR and helpful presentation of the method of construction and the use of an elementary-school achievement test is to be found in a bulletin of the School of Education of Indiana University, entitled *The Development and Use of a Composite Achievement Test* by W. W. Wright. The method used is an excellent illustration of the co-operative method of test construction on a state-wide basis, and the description indicates the care with which the items were selected. An attempt was made to provide for elements representing each of the important objectives of the elementary-school subjects, although it is probable that most of the items in the test measure information or skill only.

The remainder of the bulletin deals with the test results analyzed with reference to the different types of elementary schools. The investigator found the achievement lower among pupils of one-room and 6-6 consolidated schools than among the pupils of the 8-4 consolidated schools. Evidence is also presented to show that this achievement test is a comparatively good means of predicting the success of the pupils in the ninth grade.

R. W. TYLER